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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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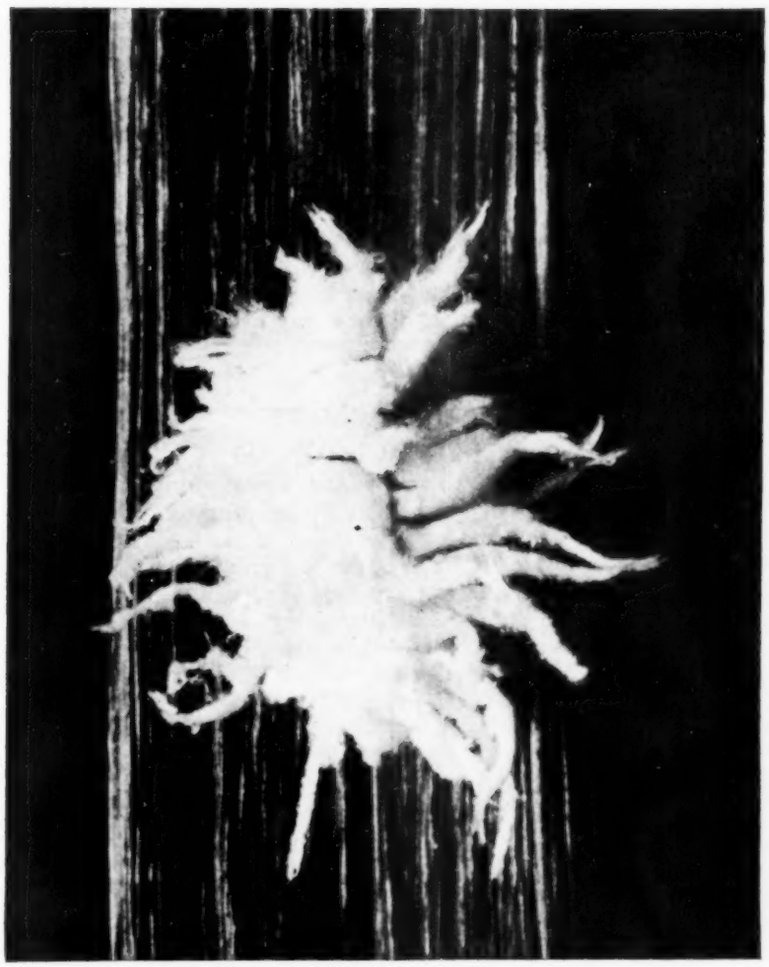


LITTLE WOLF IN COTTON CLOTHING

Scale Insect Seeketh What It May Devour

(See page 130)

Vol. XVIII No. 490

Mayas Tried to Stop Predicted Eclipses

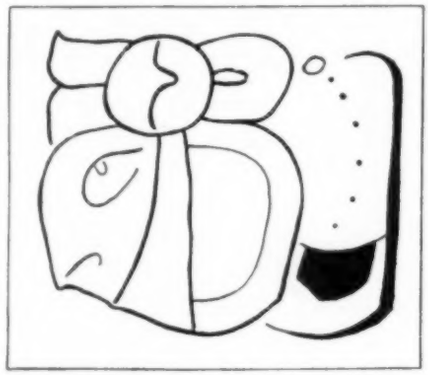
Archaeology

When Prediction Was Wrong They Said Their Magic Worked

HIGHLY accurate predictions of eclipses of the sun and the moon were made by the Maya Indians of Central America at least eight centuries before Christ, Dr. Herbert J. Spinden, curator of ethnology of the Brooklyn Museum, has discovered. But after the Mayas predicted an eclipse, they did their best to stop it, by magical means. When, occasionally, their predictions failed, and the eclipse did not occur, they attributed this to the success of their magic.

Dr. Spinden is now on his way to Europe where he will attend the meeting of the Twenty-fourth International Congress of Americanists at Hamburg, and will give a detailed report of his discoveries, which reveal a surprisingly extensive astronomical knowledge among these early Americans.

Before his departure he explained to Science Service that the Mayas, after observing and counting the



The moon face tied up in a bandage, Mayan symbol for lunar eclipses.

days between eclipses occurring over a period of a century or more, discovered how eclipses repeat after a certain period. In 752 B. C., on November 10, according to our present calendar, there was an eclipse visible from their capital city. These studies gave them the knowledge to predict them, and they worked out a period of 260 days, each with a separate name, which in multiples made a table by which eclipses could be foretold. But eclipses, especially of the sun, were supposed to be forebodings of evil, and they tried to stop them when they found that they were due.

The Mayas were at the height of their temple building civilization during the first six centuries of our era, and in their inscriptions on these temples they frequently noted eclipse days. Their hieroglyphic symbols for them were very expressive, for a sun eclipse was represented by their sign for the sun combined with the one representing darkness, so that the symbol literally means "sun-darkness." Moon eclipses were represented by the moon face with a band as if it had a headache and wore a bandage. Dr. Spinden thinks that the idea intended was that the days of the moon were finished, and that it was tied up, ready for burial.

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Dam Saves Pueblo

A TREACHEROUS little stream that flowed down a cliffside and threatened to destroy the prehistoric ruins of Chetro Ketl in Chaco Canyon, New Mexico, has been foiled by a dam which forces the stream to take another course. Rescuing of the valuable pueblo ruins was done by two Navajos, by the direction of the University of New Mexico and the School of American Research, which conducted new researches at the site this summer. The stream has been undermining the pueblo for years and has caused serious curvature in some of the walls.

The latest excavations show that the pueblo was a story taller than has been supposed, and that it stood five stories tall in its prime.

Archaeology

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The Answer Is
In This Issue

Why did the Mayas try to stop *eclipses* of the sun and moon for which they had laboriously worked out a system of *predicting?* p. 130—*How much* of the output from an *electric lamp* can a person see? p. 131—Are *sun spots* increasing or decreasing? p. 131—What are the *rings of Saturn* made of? p. 133—To what possible *use* might an *electronic motor* be put? p. 135—How is *castor oil* being made to yield "things of *joy and beauty*"? p. 136—What did people think of *Andree* and what were the *hopes* of the explorer when he sailed away to the *North Pole in a balloon* 33 years ago? p. 138—What are the relations among *sunlight, alcohol* and *protoplasm?* p. 142—How can the *baths* of famous watering places be reproduced in the *home?* p. 143.

In Cotton Clothing

WOLVES in the clothing of sheep have been familiar, at least as metaphors, for a couple of millenia. More lately, since we have begun to pay close attention to our trees and shrubs, have we become acquainted with a tiny wolf disguised as a tiny tuft of cotton. The cottony cushion scale is one of the most bothersome of the parasitic insects that suck the life-sap of plants. The magnifying eye of Cornelia Clarke's camera has picked up one of these little monsters, and gives us a better idea of the details of his camouflage, as shown on the cover picture of this issue of the SCIENCE NEWS-LETTER.

Entomology

Science News-Letter, August 30, 1930

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Just Enough Daylight Can Be Blamed For August Hay Fever

Dr. John M. Arthur, of the Boyce Thompson Institute, has also learned other new facts about light and how much of it and what kind plants need to promote their best growth.

Physics—Botany

IF YOU have hay-fever and started to sneeze in the last week or so, it was because the days are now 12 to 15 hours in length. This curious fact has been brought out in a radio talk given under the auspices of Science Service through a nation-wide network of the Columbia Broadcasting System by Dr. John M. Arthur, biochemist of the Boyce Thompson Institute for Plant Research at Yonkers.

Speaking on the subject of "Light and the Green Plant," Dr. Arthur described experiments of growing various plants under artificial illumination. In some experiments electric light was used entirely, and in others it was used as a supplement to daylight.

"The length of day affects flowering whether sunlight or artificial light is used as a light source for growing plants," he said. "That is, long day plants such as lettuce and radish which normally flower in the early summer, flower on day lengths greater than 12 hours. Everblooming types, represented in these experiments by buckwheat, flower on all daylengths from five hours to 24, while the height of the plant increases regularly with daylength. Short day plants which normally flower in the fall, such as salvia and ragweed, flower on short days of 12 to 15 hours or less. Many victims of hayfever have no difficulty in recalling that they normally start to sneeze on or about August 15 each year when the ragweed comes into flower. These unfortunates are indirectly attuned to daylength."

All Kinds of Light Needed

Dr. Arthur has also found that no single constituent color of sunlight is adequate for proper plant growth.

"In order to test some of the effects of light quality several species of plants were grown in a greenhouse covered with a red glass filter which transmits none of the blue region of sunlight," he stated. "These plants very much resembled those grown in a dark basement except that the green pigment, chlorophyl, developed. The stems were very long and weak and the leaves were narrow and thin with a tendency to roll from the midrib towards the margin. Similar plants grown in another greenhouse covered with a blue glass which transmits no red were small plants, normal in appearance except considerably dwarfed. Neither the red nor the blue region of sunlight is sufficient to grow normal plants. Some light energy from both ends of the spectrum is required."

Despite the importance of the invisible, short wave ultraviolet light in the growth of animals, including man himself, his experiments reveal no improvement in the growth of plants under these rays. "We have yet to find any distinct advantage to the plant in growing it under a glass which transmits the extreme ultraviolet region of sunlight," he declared.

Inefficient Electric Lamps

"The visible region of sunlight is most important in the unique process of green plants, photosynthesis," said Dr. Arthur. "Approximately 45 per cent. of the total energy of sunlight is in the visible region. For this reason sunlight is a more efficient light source for growing plants than the ordinary Mazda lamp which has only four per cent. of its light output in the visible region. The energy of sunlight is absorbed by green leaves and used to build up carbon compounds such as starch, sugar, cellulose and wood out of carbon dioxide from the air and water from the soil. This process is not efficient. It has been estimated that less than one per cent. of the total energy of sunlight falling upon the leaf is used. Yet inefficient as it is, this process is the ultimate and sole source of energy for our food and fuel supply.

"Most of us unthinkingly regard sunlight as a more or less constant value. When we observe the brilliancy of a battery of electric flood lights the first question we ask is: 'How does this compare with sunlight?'

More Constant Than Sunlight

"The answer is, of course, that the lamps do not compare with sunlight. Electric lamps in general are infinitely more constant. Sunlight varies in both quality and intensity from minute to minute, day to day, and season to season. Yet all these variations have limits and we realize that plants somehow manage to grow within these limits. We might conclude from this that plants are insensible to wide variations in light quality and intensity, or even that they will grow in about any quality or intensity. Only by exceeding the limits of intensity, quality and duration ranges of sunlight can one be convinced that after all, the plant not only is not indifferent to these changes, but is attuned to some of them and is easily injured whenever the natural range is greatly exceeded in any direction."

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Sun Spots Fewer

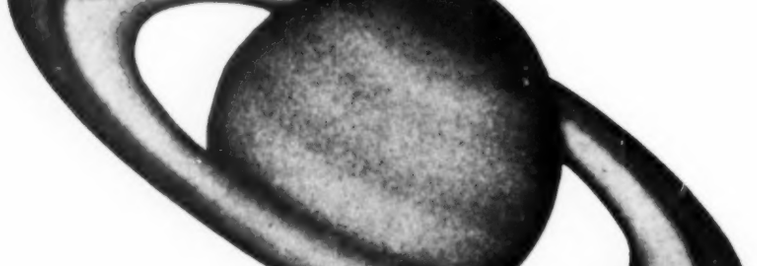
SPOTS on the sun are now declining in number, and the minimum of the present cycle will probably occur in 1934, it is indicated by records gathered by Science Service.

From November 1929 to January 1930 was a time of considerable activity, but from March to June there was a considerable decline. In July, however, the numbers increased somewhat, but this is believed to be just one of the "ups and downs" over short periods that occur inside the eleven year cycle.

Astronomy

Science News-Letter, August 30, 1930

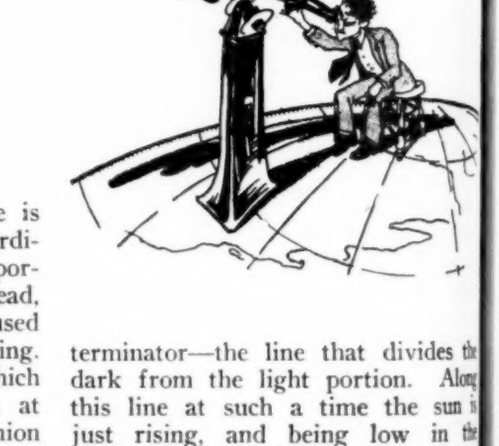
You Can Get a Close-Up Now



OF THE

Most Popular Planet

By JAMES STOKLEY



WHILE Saturn is visible in September, a small telescope is strong enough to reveal her strange rings. The beginning and end of the month is proper time to look at the moon, because the shadows across its surface are casting the huge craters into strong black relief.

MOST of the country's great observatories set aside certain nights of the week for the use by the public of their great telescopes. The scientists in charge of these institutions realize the need of letting the public know what they are doing, and are generally willing to do all that is possible to aid one who is really interested in the stars.

Unfortunately, there has not been the development in this country of the type of public observatory exemplified by one at Treptow, a suburb of Berlin, with a great telescope used exclusively by the public. But at a leading American observatory, the Allegheny Observatory of the University of Pittsburgh, one telescope is used on every clear night for visitors. Perhaps, as interest in astronomy is aroused still further by the planetarium which is open in Chicago and the one to be built soon in Philadelphia, still more opportunities will be presented to the public to look through a good sized telescope. At both of these it is planned to have telescopes for the use of visitors.

The largest telescope in the world, of course, is the 100-inch reflector at the Mt. Wilson Observatory, near Pasadena, Calif. But so valuable is the time of this instrument that ordinary visitors are not given the opportunity of looking through it. Instead, the 60-inch telescope nearby is used in this way every Friday evening. The largest telescope through which the ordinary visitor can look is at Victoria, B. C., at the Dominion Astrophysical Observatory. Here is located a 72-inch reflector—the second largest in the world. Saturday evenings with this instrument are devoted to the public.

Why the Moon Shadows

At all these places there are two celestial objects which are most popular. One, of course, is the moon. Incidentally, the best time to look at the moon through a telescope is not when it is full, but when it is shortly after first quarter, as it will be this September around the first and thirtieth. When it is full, the sunlight which illuminates the lunar features comes from directly behind the earth, and so there are no shadows to throw the features into relief. But at first quarter and after, some of the most interesting of the craters and mountains of the moon are right on the terminator—the line that divides the dark from the light portion. Along this line at such a time the sun is just rising, and being low in the lunar sky the high mountains cast long shadows over the flat plains. These shadows are easily seen with earthly telescopes, and make the peaks and valleys readily apparent.

Though it does not present the variety of aspects seen with the moon, the planet Saturn is just about as popular among observatory visitors. There is nothing else quite like it. The flat rings surrounding the planet's globe are familiar to every one in pictures, but many people seem to think that the pictures are exaggerated. Few believe that it really looks like that until they actually see it for themselves.

This month Saturn is a conspicuous object in the evening sky. In the constellation of the archer, Sagittarius, Saturn is directly south about seven o'clock in the evening, and after that is seen in the southwest.

A large telescope is not necessary to see the rings. One that magnifies as much as fifty diameters shows them, while one magnifying twice as much reveals them plainly. With one magnifying several hundred diameters, smaller details can be seen, such as the bands that cross the globe of the planet and the dark divisions that separate the rings into several parts.

Galileo Saw Rings First

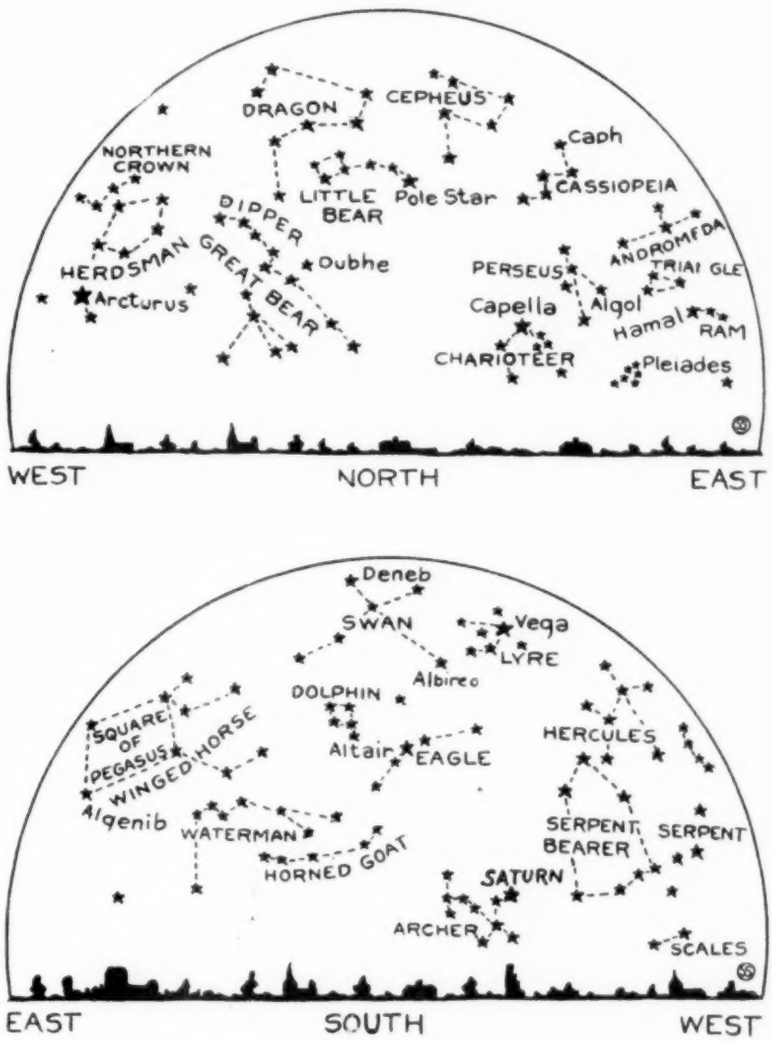
Though Galileo, first astronomer to use a telescope, was the first to observe the rings, he did not interpret correctly what he saw. This is not surprising, because his little telescope was only slightly more powerful, and not nearly as good optically, as a pair of modern binoculars. It remained for the famous Dutch astronomer, Christian Huyghens, to explain what they were. Huyghens, who lived from 1629 to 1695, was one of the greatest scientists of his time. Besides his discovery of the true nature of the rings of Saturn, he invented the pendulum clock and enunciated the wave theory of light, which finally triumphed over the corpuscular theory sponsored by Isaac Newton and has prevailed down to the present day.

In this article last month we told how Galileo announced his discovery that Venus undergoes a complete series of phases like the moon, by publishing it first in the form of an anagram. Like many other scientists of that day, Huyghens used the same method to announce his discovery of the rings of Saturn. In March, 1656, he published, in connection with some other material on Saturn, the following apparently meaningless combination of letters:

"a a a a a a a c c c c c c d e e e e e e g h i i i i i i i i l l l l m m n n n n n n n n o o o o p p q r r s t t t t u u u u u."

Three years later, in 1659, he felt sure enough of his discovery to make a full announcement, so in that year he published a little book called the "Systema Saturnium," in which he transposed these letters into their correct order, which was:

"Annulo cingitur, tenui, plano, nusquam cohaerente, ad eclipticam inclinato." This Latin sentence is translated into English as "It (Saturn) is encircled by a ring, thin, plane, nowhere attached, inclined to the ecliptic." Even today it would be hard to give a more concise description of the Saturnian ring.



THE HEAVENS IN SEPTEMBER

But this did not answer the natural question as to what the rings were made of. They appear solid, but since Saturn is at a distance of eight hundred million miles from us, we cannot see it well enough, even with the largest telescopes, to tell by looking at it. Just two centuries after Huyghens published the Systema Saturnium, the English physicist, James Clerk Maxwell, published a mathematical paper which demonstrated that a solid ring would soon break to pieces, so great would be the stresses within it. His paper concluded as follows:

Swarm of Moons

"The final result, therefore, of the mechanical theory is, that the only system of rings which can exist is one composed of an indefinite number of unconnected particles, revolving around the planet with different velocities according to their respective distances."

In other words, according to Maxwell's theory, the rings consist of a swarm of myriads of tiny moons, all moving around the planet together, and so close that from our distance they appear continuous. In accordance with a famous law of the great astronomer Kepler, who lived in the seventeenth century, the inner moons, or particles, would revolve more rapidly than those farther out from the main body. Of course, if the rings were solid, the outer portion would move with the greatest speed, just as the outer part of a wheel moves more rapidly than the inner part.

In 1895 an American astronomer, James Edward Keeler, then director of the Allegheny Observatory in Pittsburgh and later of the Lick Observatory in California, proved that

the rings were made as Maxwell had supposed. The spectroscope, which analyses light, reveals whether the source of the illumination is moving towards us or away from us. If the source is approaching, the light waves are squeezed together and the light is made bluer than if the source is stationary. If it is receding, then the waves are spread out, and made redder.

By photographing the spectrum of the star or planet on the same plate with the spectrum of a terrestrial light, as an arc struck between two rods of iron, such measurements can be made. The dark lines which appear in such a photograph may be shifted one way or the other in the spectrum of the celestial body, and indicate either approach or recession.

Keeler photographed the spectrum of Saturn to show which parts were approaching and which receding. The lines from the ring were slanted in such a way as to indicate that the inner part of the ring moved fastest, either when it was approaching us on one side or receding on the other. The outer part lagged behind, and thus a mystery first detected by Galileo was finally solved after nearly three centuries.

Venus Brighter

Saturn is not the only planet visible in the September evening sky, however. Venus, now even brighter than last month, is shining brilliantly in the southwest for an hour or so after sunset. On September 13 it reaches greatest eastern elongation, which is the time when it is farthest to the east of the sun. After that date it will begin to approach the sun again, finally to be lost completely in its glare by November. Though farthest east this month, Venus is not in a good position to view, because it is far to the south. The ecliptic, the path of the planets, is inclined least to the horizon in the evenings at this time of year. When an eastern elongation of Venus comes in the spring time, as it did a couple of years ago, then the planet shines high in the west and is much more conspicuous than now.

Later in the night the planets Mars and Jupiter can be seen. Mars is in the constellation of the twins, Gemini, and rises about 11:30 p.m., so that its ruddy glow can be seen in the eastern sky in the early morning hours. Jupiter comes along less than half an hour later in the middle of the month, so that if you get up early enough, or stay up sufficiently late, you can see these two planets close together. Jupiter is the brighter of the two, though both are very bright. Jupiter is brighter than any star, and though Mars is exceeded in brilliance by several stars, its steady red light makes it easy to identify.

Six first magnitude stars are to be seen this month in the evening skies. Low in the south is Fomalhaut, in Piscis Austrinus, the southern fish. Almost directly overhead is Deneb, at the head of the cross of Cygnus, the swan. To the west of Deneb is Vega, in Lyra, the lyre, and to the south is Altair, in Aquila, the eagle. The constellation of Bootes, the herdsman, is low in the northwest, with the brilliant Arcturus, while low in the northeast is Auriga, the charioteer, with Capella to mark its location.

The moon is full this month on the seventh, in last quarter on the fifteenth, new on the twenty-second and in first quarter on the twenty-ninth. This means that the first week or so of the month will enjoy bright moonlight evenings, as will the last few days, but in the middle of the month the evenings will be dark.

Science News-Letter, August 30, 1930

River Obeys Prediction

THE PREDICTION by Dr. Sven Hedin, noted Swedish explorer of Central Asia, that in 25 years the River Tarim in Chinese Turkestan would abandon its course and return to an ancient channel farther north has now been fulfilled, according to a communication received here. The river is running now where it did 1,600 years ago.

Dr. Hedin's attention was called to the wandering stream when he tried to follow a Chinese map 1,600 years old. It appeared that the Chinese geographers had made a mistake, for the river on the map was not on the landscape, but instead there was a "new" river to cross 550 miles away. After studying geological conditions, Dr. Hedin justified the Chinese scholars and their map, by explaining that the southern branch of the Tarim apparently swings back and forth like a pendulum. He predicted then that the accumulating silt would soon drive the river to seek its old course.

Geography

Science News-Letter, August 30, 1930

Prehistoric Mystery City in Mexico

Archæology

A PREHISTORIC city of which little is known except that it was one of the vassal-kingdoms of the Aztec Empire before the Spanish Conquest, is now being explored. The mysterious city is near the modern Otomi village of Calixtlahuaca in the State of Mexico.

One pyramid structure larger than the rest, is surrounded by ten smaller ones, all swathed in an ancient covering of earth and vegetation. The main pyramid once housed a temple on top. The base is surrounded by a series of four terraces, now cornfields, which formed a graduated ascent.

Excavations have already revealed that the city was built many centuries ago. Various cultural groups occupied the site up to the time of the Aztecs whose pottery remains attest to their influence there, if not to actual occupation.

The main pyramid has a stairway on the east fairly well preserved, and the walls still retain portions of the plaster facing with traces of red, blue, black and yellow paint.

The Christian church of Calixtlahuaca, an Aztec name which might be interpreted as "Prairieville," was built with pagan building materials, as stones carved in hieroglyphs show. Natives of neighboring villages treasure idols of clay and stone and old pottery which they find in their cornfields. A new road leads for the first time in their history from the state capital at Toluca, opening this area to modern traffic.

Archaeological work at Calixtlahuaca is under a unique local department of archaeology established by Governor Filiberto Gómez. All other archaeological investigation in Mexico is maintained by the federal government. José García Payón is directing excavations, while Dr. Manuel Gamio, well-known Mexican scientist who has known of the existence of the site for some years, has been "consulting archaeologist."

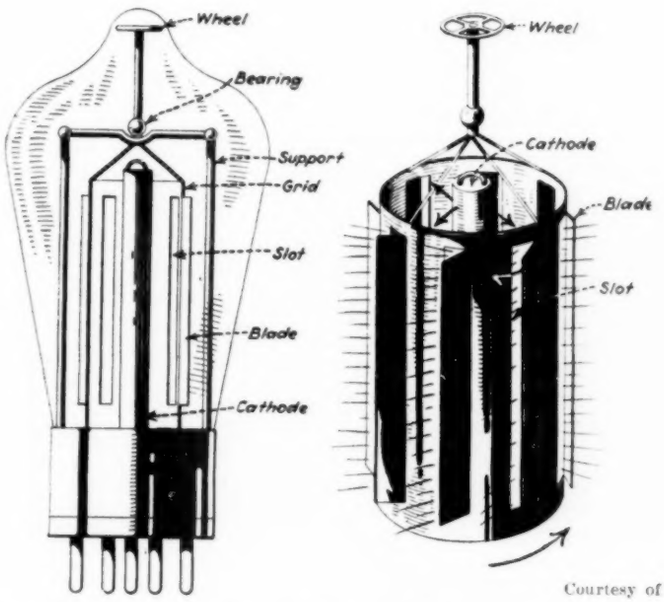
Archæology

Science News-Letter, August 30, 1930

Electrons Run Motor In Vacuum

Electronics

Improvement on Crookes' Windmill-Like Device



Courtesy of *Electronics*

The bottom arrow indicates the direction in which the electronic motor is turned by electrons which fly out from the cathode in the center.

A MOTOR that runs by a stream of minute electrons is the latest modification of the vacuum tube that makes home radio sets possible. In the current issue of *Electronics,* this tube, the invention of Allen B. DuMont, chief engineer of the DeForest Radio Co., is described.

In the center of the DuMont tube is the filament, immediately surrounded by a cylindrical cathode, from which the electrons emanate. Around the cathode hangs a cylindrical grid, suspended from a bearing at the top so that it is free to turn. In the grid are a series of vertical slots, with small blades projecting from one side of each of the slots. All the blades point in the same direction.

As the filament is turned on, the electrons are shot out from the cathode at a high speed, and after passing through the slots in the grid they hit the blades and bounce off to the outside. The impact of each electron is very minute, but with the great numbers that hit all the blades there is sufficient force to start the grid rotating.

No practical use has yet been found for the tube, as the power developed is very small. It has been suggested that it might be used for a clock, however, or as a source of alternating current.

Some years ago the famous English physicist, Sir William Crookes, who was one of the original experimenters with cathode rays, or streams of electrons, used them to produce a rotary movement. In one of his cathode ray tubes, the stream of rays was aimed at a small windmill-like device in the tube, and the windmill spun round very rapidly when the tube was operating. But this tube required high voltages to operate it, while the DuMont tube will work on voltages of the same order as used in radio equipment.

Science News-Letter, August 30, 1930

Irrigation, a Throwback of Civilization

Soil Science

PRESENT-DAY irrigation and dry farming constitute, in a way, a return to the ways of our earliest civilized forbears. Civilization originated in the semi-arid lands of the world, and only after the lapse of centuries did farming leave such places as the valleys of the Nile and the Euphrates and reach its greatest development in the moister, cooler lands of the temperate regions. Now we are again paying attention to the lands of little water, using methods that are basically the same as those of the earliest farmers but with the advantages and improvements that can be derived from modern science.

This is one of the points brought out in a review of principles and methods of soil utilization, presented at the Second International Soil Science Congress by Sir John Russell, head of the great agricultural experiment station at Rothamsted, England, the oldest institution of its kind in the world.

The two principal means of gaining a profit from warm lands of little rainfall, Sir John pointed out, differ radically in their methods and in their results. The first, which dispenses with artificial watering, devotes itself mainly to the support of grass crops, either as grazing lands producing principally wool, or as dry-farming areas producing cereals. The second, which uses irrigation, is too expensive for staple food production except in such lands as Egypt where the object is more to keep the population alive than to realize profits. Elsewhere irrigated lands are given over primarily to specialized, high-price crops, such as fruits.

The soil problems of dry-farmed land are quite different from those of the more humid regions. In ordinary farm lands organic matter in the soil is counted indispensible; it is not found so in dry-farmed lands. More than 25 per cent. of clay in a moist region condemns land as untillable and consigns it to the category of permanent pastures. In arid regions the clay content may run as high as 50 per cent. without destroying the tillability of the soil. Nitrogenous fertilizers are not so necessary on dry lands as they are on moist, but sulphur and sulfates are often effective.

Science News-Letter, August 30, 1930

Boil Mercury to Cool

BOILING mercury will take the place of electric motors and pumps in home refrigerators if a new method just announced here comes into general use. The new process is the invention of Dr. Daniel F. Comstock, president of Comstock and Westcott, and Lyman F. Whitney, of the firm's technical staff. Dr. Comstock was a former member of the faculty of Massachusetts Institute of Technology and was one of the inventors of the Technicolor process of motion pictures in color.

The machine is called a stator, because all moving machinery has been eliminated. A small boiler contains mercury, and when it is heated and the mercury boils, the vapor is discharged into a venturi tube, sucking water vapor from the cooling unit and compressing it. Under the reduced pressure the remaining water rapidly evaporates, with resultant cooling. The heavy mercury flows back into the boiler and as it does so it pumps the water from the condensed water vapor back to its original height.

Models made so far are operated by gas, but it is stated that an electrically operated unit is contemplated. Besides ordinary uses in home refrigeration, it is stated, the simplicity of the machine will make it available for a home cooling system, to bring low temperatures inexpensively to homes in even the hottest weather.

Refrigeration

Science News-Letter, August 30, 1930

Old World Borrows

IMMENSE shipments of African corn received in Mexico has called attention that Mexico, the original home of the grain, is producing less, and that tropical America is apparently fatally loosing control in the agricultural dominance of its native products.

America gave the Old World corn, potatoes, chocolate and a long string of fruits and vegetables, as well as tobacco, cotton and rubber. The string of at least 50 such products causes one to wonder what the Old World did before.

What it is doing now, is apparent from the fact that while all rubber used to come from tropical America, most of it now comes from the European colonies of the Far East. The African Gold Coast now ships more chocolate than its native America. Chicle and other native American gums are being duplicated in the Orient, and the Dutch East Indies and the Philippines are stuffing the world's mattresses and cushions with American "kapok." Manila hemp and African sisal are in the meantime rivalling Yucatecan henequen.

What has happened is that the Old World has applied scientific control of these agricultural products, which in many instances have merely been allowed to grow wild in the Americas where they originated.

Economics

Science News-Letter, August 30, 1930

Paralysis and Vitamins

IS THE type of paralysis that afflicts the person who has pernicious anemia caused by an absence in his diet of vitamin B? During the course of experiments designed to disclose the answer to this question, it was found that lack of vitamin B in the diet does cause paralysis of animals. Drs. Edwin F. Gildea, Egon E. Kattwinkel and William B. Castle, working at the Boston City Hospital and the Harvard Medical School, made the discovery. Some time ago it was observed that a diet lacking in this water soluble vitamin caused neuritis in animals.

In the recent experiment, six dogs were fed with the diet deficient in the antineuritic portion of the vitamin B extract. The dogs were given this diet until symptoms of a paralysis appeared and then they were given a full rich diet containing vitamin B and they immediately got better. Then vitamin B was again removed from the diet and the experiments were repeated several times in the same dogs.

After a while the dogs showed spastic paralysis, very similar to the one which human beings develop after they have pernicious anemia. The pathological examination of the sections of the spinal cord showed that the animals had approximately the same type of involvement of the spinal cord as that found in pernicious anemia.

Apparently a definite relationship exists between the diet poor in vitamin B and the occurrence of a spastic paralysis. What takes place in pernicious anemia is involvement of the spinal cord, either due to a poor diet or else due to the fact that the stomach lacks hydrochloric acid which is necessary to digest and absorb the necessary vitamins.

Public Health

Science News-Letter, August 30, 1930

IN VARIOUS

Beauty from Castor Oil

CASTOR oil as a thing of joy and beauty is the promise held in recent experiments in the manufacture of dyes from fat, conducted by Rajendra N. Sen and Ashutosh Mukherji, in the chemical laboratory of the Presidency College, Calcutta.

From castor oil was obtained a brown powder, which gave an orange tint to wool and silk. Cocoanut oil was also tried and yielded a brighter orange color, while olive oil made a brown dye for wools and stained silks in various shades of red.

The method used in the manufacture of the new dye was developed by Mr. Sen. It consists in using esters of benzoic, salicylic, and other acids instead of the acids themselves in the process. Chemically, fats are also esters, although they are quite different from the simpler esters of benzoic and salicylic acids.

High yields obtained in the laboratory and the ease with which the dyes may be manufactured from fats suggest that the new process will be of commercial importance. Oil fats have an advantage over coal tar, now widely used in dye making, in that the supply is continually replenished by nature, in the tropics or on farms and plantations. Hence there is no danger of exhausting the supply, even in the remote future. Also many of the oils can be obtained at a much lower price than ordinary dye materials.

Chemistry

Science News-Letter, August 30, 1930

Rain Shadow

STUDY OF the early stages of the recent drought as it affected the region of Washington, as well as of previous droughts, shows that there is a "rain shadow" to the east of the Appalachians, Prof. A. J. Henry, of the U. S. Weather Bureau has found.

In the period from April 18 to May 14, this year, no measurable rain fell at Washington, even though several storms passed to the eastward over the St. Lawrence valley. He has found similar effects previously. This leads him to believe that the Appalachians cast a "rain shadow" for storms travelling from the west along the St. Lawrence.

Meteorology

Science News-Letter, August 30, 1930

SCIENCE FIELDS

Maize, Not Pig

CHARLES LAMB'S delightfully told story that roast pork was discovered in China when fire destroyed a house and cooked some baby pigs to a turn inside it has a parallel in American Indian lore, cited by Mrs. Zelia Nuttall in the *Journal of Heredity*.

The Indian legend has it that the ancient founders of Mexican civilization were so troubled by wild beasts in the forests that they set fire to the trees and cleared the land. They noticed that grains of maize and other plants which the fire had roasted were very delicious to the palate. They collected some burnt grains and planted them in the same soil and awaited the harvest.

This legend tracing the dawn of American farming and cookery was obtained by an Italian historian in Mexico some 40 years before Charles Lamb was born.

Ethnology

Science News-Letter, August 30, 1930

Another Dust Explosion

ALMOST all kinds of dust, even powdered metals, like aluminum or iron, are explosive when floating in the air, so the explosion that wrecked a grain elevator in Baltimore recently was not a very unusual occurrence. It was due to grain dust, floating in the air, and might have been started by an electric spark, though the cause cannot definitely be stated at present, and perhaps never will be ascertained.

The Chemical Engineering Division of the U. S. Department of Agriculture is investigating the explosion, under the direction of David J. Price, in charge of the division. He is being assisted by H. R. Brown and B. J. Cuip, two of the division's engineers.

Speaking to Science Service before the investigation, Mr. Price expressed surprise that the explosion occurred in the Western Maryland elevator, however. He said that it was a modern plant, of reinforced concrete construction, with modern machinery and was well managed. In fact, Mr. Price said, it was considered one of the best elevators in the country. In view of this, he thinks, the explosion may have been caused in some way that his investigations have never before encountered.

Though a pile of dust will not burn if a match is touched to it, and the match may even be extinguished, this is only because the grain does not have a supply of oxygen to keep it burning. When the same dust is floating in the air, each single grain has a supply of oxygen in the air around it. The result is that when it starts it burns so rapidly as to make a real explosion.

Chemical Engineering

Science News-Letter, August 30, 1930

Mayan Ceremonial Room

PAINTINGS on the walls of ceremonial rooms, where prehistoric Indians held their important secret rites, have been brought to light by the Field Museum Archaeological Ex- built on the ruins of the earlier one. This he believes to be a unique procedure, nothing of the sort having pedition to the Southwest, it is announced in a report received here from Dr. Paul S. Martin, leader of the expedition.

Two of these ceremonial rooms, of the type known as an Indian kiva, have been discovered at the Lowry Ruin, in southwestern Colorado, Dr. Martin reported. The later kiva was been found heretofore.

"Great was the surprise," Dr. Martin wrote, "when we found that still adhering to the walls of the upper room were fragments of paintings which had not seen the light of day for probably well over a thousand years. These paintings are entirely geometrical and had been executed in black and white.

"Even greater was our surprise in penetrating into the lower kiva to find that the paintings on its walls also were preserved, more perfectly than in the room above. Here the design is one that is frequently seen on prehistoric pottery, representing rain, lightning, and clouds. So far as is known at present this is the first example of such a design on a kiva wall."

Many of the old, original roof beams of the structure are still in place, Dr. Martin found. It is expected that when the tree rings are examined it will be possible to set the date of the ruin.

The Lowry Ruin is one of the largest ruins of its kind in the region, and has been previously untouched by archaeologists' spades.

Archæology

Science News-Letter, August 30, 1930

Tellurium, a Medicine

IF THE patient can stand the smell of tellurium, which has an intense garlic odor, it may prove useful in the treatment of syphilis in cases that do not respond to more usual medication.

Dr. A. D. Frazer, a health officer of the County Borough of Dudley, treated with tellurium or its salts, seven individuals who contracted the disease, most of them more than twenty years ago. Four cases out of the seven were favorably influenced by this new drug, though the standard cures were ineffective. Tellurium has the advantages over many other drugs in that it produces improvement when the disease is of long duration and firmly entrenched and the patient becomes resistant to treatment.

Since tellurium in the amounts given to patients is not poisonous, its only disadvantage seems to be the offensive smell. In countries where the aroma of garlic is tolerated or even liked, tellurium will, according to Dr. Frazer, prove of great value.

Medicine

Science News-Letter, August 30, 1930

Average Number Meteors

THE AUGUST meteors, or shooting stars, that are especially numerous every year on the nights of August 11 and 12, came in average numbers this year. The return was not distinguished by any particularly brilliant meteors. This announcement is made through Science Service by Dr. Charles P. Olivier, director of the Flower Observatory of the University of Pennsylvania and a leading authority on meteors. Dr. Olivier has received a large number of reports of the meteors from lay observers throughout the country. This he atfributes largely to a recent article in the SCIENCE NEW-LETTER and to other publicity given the matter by Science Service.

Dr. Olivier himself watched on the night of August 11 for five and a half hours from a point in the country well away from the city lights. In this period he saw 66 meteors, a rate of 12 an hour. By comparing his observations with those of others who watched at the same time from other points, he will be able to calculate the heights of a number of the shooting stars.

Astronomy

Science News-Letter, August 30, 1930

The Andree Balloon Flight —A Classic of Exploration

Geography

LETTERS FROM THE ANDREE PARTY, in McClure's Magazine, Vol. X, No. 5, March, 1898.

The bodies of Andree and at least one of his companions were found on August 6 of this year, on an island northeast of Franz Josef Land, now called Fridtjof Nansen Land in honor of another Arctic explorer. In the 33 years since the flight described in this "Classic," except for one message brought back within a short time by a carrier pigeon and several afterward found floating in the sea, all of which gave positions of the balloon far off the course the explorers had hoped to follow toward the Pole, no clues to the fate of the party have ever been found. When the records found with the bodies have been thawed out enough to be read, they will furnish the long-awaited last chapters in an outstanding Arctic mystery.

ON the 11th of last July, one Sunday afternoon, S. A. Andree, with two companions, Nils Strindberg and Knut Fraenkel, ascended from Danes' Island in the balloon "Ornen" (The Eagle) and sailed away northward, hoping by this untried means to reach the North Pole. Daring even to foolhardiness as Andree's project may well seem, it had been very coolly and prudently matured and systematically prepared for. . . . .

Andree's first design was to sail in the summer of 1896. The balloon and all stores and appliances were conveyed to Danes' Island; a balloon house was erected, and engines set up for producing hydrogen gas and inflating the balloon. All, indeed, was made ready; but the south wind they wanted for the start did not come. They waited for it until the season had advanced too far for a safe venture, and then came back to Sweden. In May, 1897, they returned, and by July 1 again had everything ready for a start. And again the south wind refused to come. They had to wait ten days for it. We have a very interesting view of the party at this trying time as well as a full account of the work they had had to do in getting ready, in the following letter, written by Andree's companion, Nils Strindberg, to his brother in New York and not before published:

Letter from Nils Strindberg

"Yes, now the folks at home believe us to be ascended. From Anna I had no letter, and papa was very doubtful about his letter reaching me. But alas! it is true that we have not yet departed. As you have probably heard through the papers or letters from home, we anchored the 30th of May in Virgo Harbor, after having been detained by the ice in Danes' Gate. It seems to have been an exceptionally mild winter. There is considerably less snow this year than last, which still was milder than the average winter. The balloon house stood when we arrived, but was so damaged by the winter storms that it was on the verge of collapsing. But one must remember that it was only calculated to remain for one summer. With the aid of tackle and buttresses it was soon fixed, and June 14 we brought the balloon from the *Virgo* to the balloon house. On the 16th the balloon was stretched out on the floor, which had been covered with thick, coarse felt. The *Virgo* left Danes' Island on the 16th. And now we had our hands full to make the balloon tight and to inflate it. To make it tight we had to varnish all the seams on the outside as well as the inside. In order to varnish the inside the balloon is partly inflated with air by a large bellows, and the workmen crawl in through the lower opening. Svedenborg, Fraenkel, Machuron, and myself take turns in the superintending of the inside varnishing. The interior of the balloon is a very strange sight. It looks like a low vault of stone masonry. . . . There we were, eight men, each with a pot of varnish and a brush, and varnished every seam of the upper half of the balloon. The varnish makes the air very bad, and after some time one begins to feel a pain in one's eyes, as of onions.

"On Saturday, the 17th, at 7 o'clock in the morning, the hydrogen apparatus was started and put in connection with the balloon, and at 12 o'clock, midnight, between the 22d and 23d, it was inflated. Then it had to be tested as to its tightness and the principal holes fixed. This was done by a new method invented by Mr. Stake. It is simply to allow the few particles of hydrogen sulphide, which are always produced with the hydrogen, to accompany the hydrogen into the balloon. If pieces of muslin saturated with a solution of acetate of lead are put on the balloon, the smallest leakage may be discovered by the escaping hydrogen sulphide, which causes the muslin to turn black. This method proved to be very practical, and we discovered several small holes which could be fixed. During these operations one walks around on top of the balloon, which only yields imperceptibly. . . .

Ready to Fly

"After these preparations we have succeeded in getting the balloon in pretty good shape; at all events much better than last year. It loses daily about 45 kilos (a fraction over 99 pounds) in carrying capacity; but as we have possibilities of throwing out 1700 kilos (about 3748 pounds) of ballast, we will easily float for more than a month.

"We do not intend to start until we get a favorable wind, to avoid being pushed right back to Spitsbergen by contrary winds. If we get the right wind we ought to be able to go some distance in these thirty days. With a fairly strong wind we will make from 10 to 20 knots an hour, and will reach the Pole, or a point near it, in from thirty to sixty hours. Once having reached the northernmost point, we don't care where the wind carries us. Of course, we would rather land in Alaska near the Mackenzie River, where we would very likely meet American whalers, who are favorably disposed toward the expedition. It would really be a glorious thing to succeed so well. But even if we were obliged to leave the balloon and proceed over the ice, we shouldn't

consider ourselves lost. We have sledges and provisions for four months, guns, and ammunition; hence are just as well equipped as other expeditions as far as that is concerned. I would not object to such a trip. The worst thing is that the folks at home will feel uneasy if we don't appear in the fall, but are obliged to spend the winter in the Arctic regions. My body is now in such good condition, and I have got so accustomed to the Arctic life, that a winter up here don't seem terrible at all. One gets used to everything. But the best thing would be to come home in the fall. . . .

"Well, I hope we shall soon have favorable winds. On the 8th day of July we had a strong southerly wind, but then it was too strong. It was almost a gale, and it would have been impossible to ascend without damage to the balloon. Later it shifted over to the west too much. If we don't get a southerly wind before the 15th of July we intend to try with a southeasterly, to be carried north of Greenland, and there possibly utilize the south winds which, according to Lieutenant Peary, are prevalent during summer.

"Well, goodbye, now, brother; just wonder if we will meet next time in New York. . . .

"Your brother,

NILS."

ACCOUNT OF THE START OF ANDREE, by Axel Stake. Published by McClure Syndicate, March 13, 1898.

I was the chemist of the expedition which fitted out Andree for his North Pole journey. I made the gas which carried his balloon away to the north. I kept a diary of all the events that happened from the time the expedition was first assembled in Sweden until Andree and his companions disappeared beyond Fogelsang on the northern horizon. From what I have seen printed in the papers both here and abroad I do not think that all of the happenings of the departure can be known to the public at large. For instance, it may not be known generally that Andree was very reluctant to depart on his voyage on that rather memorable July 11. His own wish was to defer the start to the next day. I do not believe he would have gone on the 11th had he not been urged to go by his companions. He is very painstaking and careful as a rule, and in his middle age far more discreet than the youth of his companions allowed them to be. But Strindberg and Frankel had waited so long and hoped so much for a breeze from the south that they were eager to be off. They were afraid the breeze would die away and the expedition would be left stranded on Danes' Island, as it was in 1896.

"The Tightest Balloon Bag Ever Made"

The South Wind

I remember very well the morning of the 11th. Strindberg and I occupied the same cabin on board the Swedish gunboat which carried us up to the island. Strindberg came running to me that morning and awoke me in my bunk, crying, "The breeze! the breeze! We shall sail today. The wind is from the south." I laughed at him, for I did not believe it was possible. But when I came out on the deck, I found that the preparations for the start had already begun. Andree was doubtful. In his mind this southerly wind might be a false alarm. He thought they had better wait a day or so and see if it would continue. A conference was held on the vessel, after which, reluctant as yet, Andree went ashore to the balloon house to see if the breeze was quite as strong there as it was on board the gunboat. During the morning he had been making meteorological observations, and the results added force to the pleadings of his companions. He came on board the vessel again, and a second conference was held. It was finally decided to go that day, and immediately the order to knock down the front section of the balloon house was given. This was at 10:30 a. m. At 2:30 in the afternoon the balloon sailed away.

Andree went away with the impression that the balloon would float at least six weeks. Indeed, it was his idea in 1896 that he could keep in the air for a year or more if necessary, but the trouble we had with the escaping gas soon dispelled this notion. I think that even after he found how impossible it was to confine the gas he overrated the time he would be able to keep afloat. The expert from the balloon factory and I made a minute calculation of how long the gas would remain in the bag, taking into consideration its slow escape through the minute interstices which we found it impossible to close up. Our calculation was that the balloon would remain afloat, barring accidents, not longer than fifteen days. The "Ornen" probably was the tightest balloon bag ever made, but we could not close up some of the holes. I invented a process for detecting the escape of the gas. After the balloon was inflated we spread long strips of sheeting saturated with acetate of lead

over the top. The confined hydrogen sulphide as it escaped would, on coming in contact with the sheeting, cause the latter to become discolored. Thus the exact location of every hole could be ascertained.

Even so, although we varnished and revarnished the silk inside and out, we could not prevent the almost imperceptible holes. The greatest trouble was in the seams where the sections of the great bag were joined. The finest needle hole was sure to show a leak, even after the stitching had been done as neatly as possible. It may not be known that the successive varnishings could be done satisfactorily only on the upper part of the bag, against which the greatest outward pressure of the confined gas was exerted. Of course we would have done the lower part of the balloon more thoroughly, but we had not time. The aeronauts were eager to sail with the first good south wind, and we had to let them go. Strindberg had made some experiments to reduce the outflow of the gas, but they were without success. The constant smearing on of the gutta-percha which we used was really the best we could do. Our estimate of fifteen days' duration for the gas, small as it was, would provide for its retention twice the length of time that gas has ever before been confined in a balloon. I believe that no balloon heretofore has floated longer than a week.

Loss of Drag Ropes

Andree was handicapped at the start by the loss of two-thirds of his drag ropes, upon which he depended to steer his balloon. The accident was a curious one, and while it could not have been foreseen, yet the conditions under which it happened might have been avoided if different arrangements had been made. The drag ropes of the balloon, which were about 1,000 feet long, were in three sections, and were joined together by metal screw couplings. The couplings could be screwed apart, the inference being, I suppose, that if Andree wanted to do so he could unscrew and cast off any part of the drag rope. Why he could not just as easily have cut them apart I do not know. Now, when the balloon was ready to start, the drag ropes attached to the lower side of the basket were allowed to trail up over the top edge of the balloon house and down again to the beach along which they were trailed, so as to be clear of all obstructions and ready to follow the balloon out to sea when it rose out of its nest.

But the heavy weight of the ropes defeated this purpose. The part of the ropes which lay outside on the beach offered an immense friction, which the balloon seemed unable to overcome. Instead of following the bag out of the house, uncoiling as they went, the upper sections of the drag ropes twisted, and under the severe strain the couplings unscrewed. For a moment it seemed that the balloon would not get away; that the friction of the heavy ropes would hold her to the shore. Then, to our astonishment, the couplings parted and the airship darted upward.

The question whether or not the loss of these ropes would prevent Andree from steering the balloon has been openly discussed. It is impossible to tell, of course, though he may have remedied the defect by putting out another drag rope composed of the rope which hung from the basket and which for the time being was used as ballast.

When the balloon rose out of the house some portion of it caught on the structure of the balloon house. Andree was heard to exclaim "What was that?" Then we heard Strindberg crying, "Long live old Sweden!" A boat had pulled out from the shore, and as the bag tore away Andree grabbed a speaking trumpet and shouted to those in the boat. From his motions every one believed he was trying to say something about the loss of the drag ropes, but no one could understand what he said, and as the balloon got farther and farther away, the difficulty of making himself understood became greater and greater.

WHERE IS ANDREE? By Walter Wellman, in McClure's Magazine, Vol. X, No. 5, March, 1898.

There are three probabilities as to the approximate point of descent, each strong enough to merit attention. The first of these is that the "Ornen" remained in the air till Franz Josef Land was reached. Once over this land, the aeronauts would be able to distinguish it by the changed appearance of the ice-sheet beneath them and by the black cliffs at the edges of the fiords Here Herr Andree may have become convinced of the uselessness of waiting for further advance toward the Pole, and in consequence decided to descend. In such case, and if the descent were made in safety, the voyagers might without great trouble make their way to Cape Flora, about the eightieth parallel, where Jackson left a comfortable house and ample supplies for a wintering. In case their descent were made so far from Cape Flora that they were unable to reach the Jackson camp before the winter closed in upon them, Andree and his campanions might shoot enough bear, walrus, and seal to support them through the winter, and throw up a hut to live in, as did Nansen and Johansen in the same region.

The second probability is that the "Ornen" came down in the ocean to the southeast of Spitzbergen. When Herr Andree was asked a few days before his start what would happen if they descended in the sea, the adventurer replied, coolly, "Drown."

The third probability is that the air-ship was driven by the winds far to the east or northward of Franz Josef Land. In such case the explorers are probably lost. Assuming that they safely reached the ice-sheet which covers the Polar ocean, saving all their supplies, instruments, and equipment, this was the situation which confronted them: to save their lives they must get to land within eight weeks. Out upon the Polar pack no game can be had, except by rarest good luck a stray bear comes that way. Andree and his men had with them provisions for but four months. With this supply they could live till Christmas, but in order to secure food with which to survive the winter they must reach the land by the end of September at the latest, before the bear, seal, and walrus had disappeared. The distance which they could travel between the probable date of the descent and the closing in of winter may be estimated at 250 miles at the greatest. In August and early September the condition of the ice-pack is at its worst for sledging, being soft and slushy, with many pools half filled with sludge through which a boat cannot be rowed and over which a man cannot walk.

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The mushroom known as "Caesar's mushroom" has been esteemed as food since the time of the Greeks and Romans.

Nov. 22

What the World Would Look Like After a Million Years of Drought

IS told in Science News-Letter's second report on the recent International Botanical Congress which met at Cambridge, England. This article also explains how a botanist analyzes the soil from an airplane; it tells why scientists spend years studying the sex life of the fungi, and describes a form of evolution of moulds that takes place almost over-night.

SUPPOSE the drought extended millions of years instead of a few weeks. What would happen to the vegetation then was discussed by the two eminent botanists, Prof. T. G. Halle, of Stockholm, and Prof. A. C. Seward, of Cambridge.

Evolution on a grand scale would be promoted if the American lack of rain experienced this summer were stretched to extend millions of years.

The botanists were not just using their imaginations. For something like an extremely lengthy drought happened in the Permian geologic age, about two hundred million years ago, in the interval of earth history between the luxurious exotic vegetation of the coal age and the beginnings of the age of reptiles when dinosaurs ruled the earth and our present flora had its beginnings.

At that time of drought the myriad of strange carboniferous species were cleared off the face of the earth as with a razor.

Then a new kind of plants, quite different from the vegetation of the coal age and beginning to look really modern, began to evolve upward in the precarious struggle for existence.

The layers of earth laid down in the eons between the Permian and the present tell the story of long periods of great dryness. Few of the plants are preserved in the record of the rocks as fossils but such as are discovered there have leaves and roots adapted to life under conditions of drought.

While it was one long drought in Permian times, the botanists find that it was not necessarily hot then. Sometimes, their studies show them, glaciation is an effective aid to plant evolution by sweeping clear large land areas and leaving empty land suitable for rapid development of new types of vegetation when times and climate become better.

How plants today keep house in deserts under conditions like those that occurred in the ancient Permian age was discussed by Prof. N. Maximov of Leningrad, Dr. B. Huber of Freiburg, Germany and Dr. E. Schratz of Berlin. Contrary to former notions, plants of the desert often evaporate more water into the air than the plants of moist regions. Their thick harsh skins, often covered with hairs, hold evaporation to a very low value when their leafpores or stomata are closed. But when rains bring brief and temporary abundance of water, the desert plants open their pores and the evaporation of water is then very rapid. This increased activity on the part of the plant means that it is manufacturing food at a rapid rate while the water is available for this purpose.

Desert plants resemble some human beings in that they work hard and spend freely when times are good but live parsimoniously when they are broke.

Botanical Airplane Survey

Airplane surveys, or photographs made from the air, are the latest tools of the botanist and soil scientists in their service to farmers. From hundreds of feet in the air they find it possible to probe scientifically into the soil some eight to ten feet under the surface.

Not that the photographs mysteriously penetrate into the soil itself but they give up pictures that tell the conditions of crops.

Dr. W. L. Balls, of Cairo, Egypt, explained that since soil conditions powerfully influence deeprooted crops, the plants that grow can be used to tell what is beneath the surface.

He uses the roots of cotton, corn, clover and other crop plants as instruments of exploration. Standing on a hill he makes a detailed survey of soil conditions through his binoculars. Then he checks his results by making occasional borings into the soil and by taking airplane flights to obtain a more general view.

Study Sex of Fungi

Sex life among the fungi was discussed by the scientists attending this International Congress.

This may sound frivolous but the subject is really of profound practical and economical importance. Fungi are the germs of the worst crop and orchard diseases and they are the spoilers of food, clothing and other things used by man.

Prof. J. H. Craigie, of Winnipeg, announced to the botanist "that he has discovered that blackstem rust of wheat, a serious disease of that cereal, hybridizes and originates new strains of that fungus." This is unhappy news to wheatgrowers since it may mean that the new rust resisting wheats that plant breeders have developed through hybridization may find the disease that they were bred to escape evolving to catch up with them. Growers of the new hybrid wheats given them by science may find them attacked by the new rusts and the battle between scientist and fungus will need to be renewed.

Pink mold such as sometime grows on the housewife's bread follows the laws of heredity as discovered by the monk Mendel in his monastery garden. Dr. B. O. Dodge, of the New York Botanical Garden, told the congress that three species of pink breadmolds that he had crossbred showed typically mendelian hybrid behavior among their offspring. One kind of mold that has two protoplasmic hearts or nuclei keeps its love-making within its own particular group, but another strain adventurously marries out of its species every chance it gets.

Piratical partnerships between fungi and parasitic insects preying on trees

were described by Dr. J. N. Couch, of the University of North Carolina. The scale insects that suck the sap of trees live in shelters formed by the fungus. They raise large families of young insects which crawl away carrying the fungus with them and planting it in new unworked locations. Thus the children pay the fungus for the service it rendered to their parents.

Sometimes however there is double-crossing among these parasitic gangsters. The fungus will infect and devour some insects instead of housing them and at other times an invading fungus is merely used as food and digested by insects.

Alcohol's Love for Protoplasm

Alcohol, the liquid that has caused much political and moral controversy, particularly in America, has a fatal attraction for protoplasm, the very basic stuff of life which forms a large part of every living plant or animal cell.

This scientific observation was presented to the Congress by Prof. L. Jost, physiologist of Heidelberg University, Germany.

The protoplasmic lining of plant cells lets alcohol through much more readily than it does water, this eminent scientist explained. Some plant cells placed in a solution of half alcohol and half water absorb alcohol so greedily that they become greatly swollen, burst and die. The substances that have such an avidity for alcohol are apparently lipoids, fatty substances that play an important part in the structure of living matter. And if the plant is given a good place in the sun it soaks up more alcohol with disastrous results because ordinary simple sunlight increases the permeability of the protoplasm.

Sun Speeds Things Up

But this speeded action due to the rays of the sun is not partial to alcohol alone, for Prof. W. W. Lepeschkin, of Tuscon, Ariz., reported that plants put in colored water and exposed to the light, become colored faster than plants that were left in the dark. The dye always travelled faster in veins and leaves of the illuminated plants than those not in the light.

The kick in coffee, tea, cocoa, and other such mildly stimulating beverages is due to substances that are of apparently secondary importance to the plants themselves, Prof. T. Weevers, of Amsterdam, told the botanists. Caffein, theein and such substances appear in the young leaves but disappear as plants approach maturity. Sometimes, as in coffee and cocoa, these substances migrate to the seeds and are stored there. Despite the fact that man cultivates and raises plants to obtain these stimulating substances, they seem to be to the plants merely halfway products used in the chemical upbuilding processes of the plant.

Evolution While-You-Wait

Whatever believers in the permanence and unchangeability of species may have to say about higher plants, they must speak softly when they deal with the lowly moulds. Evolution while you wait seems to be the order of the day with some of them.

Dr. William B. Brierly of the Rothamsted Experimental Station, England, told of his experiences in culturing *Botrytis cinerea*, a common fungus found on grapes.

This organism simply will not "stay put," he has discovered. Starting with a single spore, to make sure he had as uniform a stock as could be secured by any known method, he found that the offspring organism varies constantly. Some of the variations were discontinuous, some progressed continuously. He could induce a continuous modification at will by varying the culture medium, and return it to the original type by restoring original environmental conditions. But some of the discontinuous variants refused to revert to type even under prolonged selection.

If you were a physician, what would you make of a disease germ that changed its trade almost overnight, and thereafter produced some other kind of disease?

That is one of the diagnostic difficulties that plant pathologists are up against, it is indicated from studies by J. Henderson Smith of the Rothamsted Experimental Station.

The only way one can be quite sure of his diagnosis of a plant disease caused by a filterable virus is to have a pedigreed culture of the virus and a standardized host plant of known source, age and environment. Under unstandardized conditions, such as one has to deal with in the field, the symptoms of the various virus diseases differ so much as to make identification by inspection alone untrustworthy. Even a difference in the mode of infection may make a considerable difference in the appearance of the disease.

The most baffling difficulty encountered in some cases, however, is the tendency of the viruses themselves to change, especially when the disease has been transferred from one plant to another of a different species or variety. These changes in some instances seem to be permanent.

The virus diseases with which Mr. Smith has been dealing are caused by organisms (if they are organisms) too small to be seen with even the highest powers of the microscope. Whatever the causal bodies may be, they can pass through the pores of a fine-grained porcelain filter; whence their name, filterable viruses.

Plant Made a Hinge

What happened to a plant when it is turned into a hinge was investigated by Prof. P. Jaccard, of Zurich. He arranged an apparatus that bent plants back and forth at intervals from a minute to a day. Afterwards he dissected the plants and studied their structure. He found tissues that ordinarily were woody remained unhardened and that the normally woody parts elsewhere were modified in shape and position to meet the new conditions.

Science News-Letter, August 30, 1930

The ponderous stone temples and palaces built by the Incas in Peru had roofs of thatch.

Recent excavations in Crete have revealed remains of houses, their painted stucco pavements and stairways still brilliantly colored, and many of the household articles still among the ruins.

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NATURE RAMBLINGS

By Frank Thone

Lesser Trees

ONE of the things that proves most striking to the traveller in the tropics who gets into the real forests of those lands of the sun—not the tangled thickets on river-banks or clearing-edges—is the emptiness of the spaces between the trees. Their huge trunks rise like pillars in a cathedral to heights of a hundred feet or more, and support a canopy of interlaced tops so dense that beneath it a perpetual twilight reigns. The ground beneath is naked of ferns and herbs, and there is no underbrush, no growth of small trees. All the leafage is concentrated up there at the top, competing fiercely for the favors of the ardent sun.

It is different in the broad-leafed forests of the temperate zones. Here the canopy is not so thick, some light filters through, and there is a succession of layers of vegetation. On the ground a mat of moss, above that a stratum of ferns and wildflowers, then lesser and greater shrubs, and finally a family of trees that are content always to remain of secondary height. It is a kindlier forest; the leaves condescend to the man on foot, and do not remain altogether aloof in the gleaming courts of the sun as they do in the tropics.

These lesser trees—hop hornbeam, ironwood, bladdernut, water beech, and a number of others—are worthy of more attention and cultivation by the average householder than they have received in the past. They are for the most part hardy, they are interesting in leaf and fruit, and most important of all they do not grow too big for the ordinary small city or suburban lawn. A few elms or oaks or maples may easily make an ordinary lot too crowded after a few years because they have an embarrassing habit of growing too big.

Forestry

Science News-Letter, August 30, 1930

Reproduce Famous Baths in Home Tub

Medicine

THE BENEFICIAL baths of a famous German watering place may now be had in the home by means of a simple apparatus called a bubble or foam distributor. The method of using this apparatus and its advantages were reported to the *Lancet,* an English medical journal, by L. Shillito of the electrotherapy department of St. Thomas's Hospital in London.

The natural baths, of warm effervescing water, have been very successful in the treatment of heart disease. Because of the expense of the visit to Nauheim, however, many have been deprived of the help the baths give. With the new device, the patient may have them in his own bathtub at home.

The main physiological effects of the baths are due to the temperature of the water and to the carbon dioxide it contains. This gas has an effect on the blood circulation. The carbon dioxide bath is said to be the only physical method of treatment in which the heart muscle is trained without at the same time increasing the pulse rate.

"By a gradual increase of the carbon dioxide content and a reduction of the temperature of the bath, the heart can gradually be forced to do more work, and through this increasing exercise its musculature becomes strengthened, the tone increased and reserve power augmented. The sensation of warmth produced by the strong circulatory reaction allows a lower temperature to be tolerated without shivering," Mr. Shillito said.

The health continues to improve for some months after a course of these baths. This is probably due to a slow and gradual process of repair in degenerated organs which have for the first time, possibly, in years been provided with a more healthy circulation of blood.

Science News-Letter, August 30, 1930

Deformed Indian

THE ELABORATE burial of a prehistoric Indian leader who suffered the uncomfortable distinction of a deforming bone disease has been discovered by the University of Chicago field party excavating near Lewiston, Ill., under the direction of Dr. Fay-Cooper Cole, professor of anthropology at the university.

The Indian, who was only about 35 years old when he died, was terribly deformed by the inroads of osteitis fibrosa, an inflammatory malady of the bone, Dr. Cole stated to the SCIENCE NEWS-LETTER. Dr. Cole suggests that this very deformity may have set the young Indian apart as a man of distinction in the eyes of his fellows. His burial, which was given signal attention, bespeaks the honors paid to a chief or medicine man.

"At his head, probably in his hair, was a long bone pin," Dr. Cole explained. "At each ear was an imitation wolf tooth pendant made of shell; at each arm a real wolf tooth perforated; about his neck a strand of 500 shell beads; at one elbow an effigy pipe, discoidal stone, and a stone blade; at the other arm five stone blades; while beside one leg was a beautifully made discoidal stone."

The prehistoric Indian burial is one of sixty which the expedition has unearthed in a single mound on the estate of Joy Morton, of Chicago.

Archaeology

Science News-Letter, August 30, 1930

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FIRST GLANCES AT NEW BOOKS

BRIEF GUIDE TO THE DEUTSCHES MUSEUM—*Deutsches Museum (Munich, Germany)*, 76 p., 2RM. American science teachers have long been hearing of the great "Deutsches Museum von Meisterwerken der Naturwissenschaft und Technik," generally known by the first two words of its full name. They have heard how it was created almost entirely by the work of Dr. Oskar von Miller, until now, with its 9 miles of exhibits in 9 acres of floor space, in addition to the huge buildings housing the library and lecture hall, it is the greatest institution of its kind in the world. Similar institutions are now being born in the United States, particularly in Philadelphia, Chicago and New York, but the Deutsches Museum will long remain the standard by which others are judged. In this "Brief Guide," prepared by Mr. Theodor Conzelmann, of the museum staff, there is now available a description in English of the most important exhibits. It is copiously illustrated, with 40 halftones and 8 plans, and though intended, of course, as a guide to the museum visitor, it will be equally interesting to one who does not have this pleasure, but who wants to know more about the musuem's field. For a full account of all the exhibits, one must turn to the 443 page "Amtlicher Fuhrer," which, however, is published only in German.

Science Education

Science News-Letter, August 30, 1930

STUFF—Pauline G. Berry—*Appleton*, 495 p., $5. "Strife for stuff! That is what much of life is." So opens this story of materials in the service of man. It has a wide sweep that extends from ancient pharaohs to modern brides clothed entirely in rayon made from what was once a waste product. This book gives the non-technical reader a new view of his material surroundings.

General Science

Science News-Letter, August 30, 1930

PLAYING AIRPLANE—J. F. McNamara—*Macmillan*, 128 p. Youngsters not yet ten will be thrilled when this book is read to them. The author is an ex-aviator who wrote it to answer the questions of his own six and eight-year-old sons and their friends.

Aeronautics

Science News-Letter, August 30, 1930

THE LAST CONTINENT OF ADVENTURE—Walter B. Hayward—*Dodd, Mead & Co.*, 339 p., $3. Not so much a history of Antarctic exploration but "a narrative of courageous and indomitable men who have invaded a savage and defiant land." Here in vigorous prose, based on the books and journals written by the explorers themselves, is the record of man's conquests of one end of the earth.

Geography

Science News-Letter, August 30, 1930

ECONOMICS OF WORLD PEACE—July, 1930 number of The Annals of the *American Academy of Political and Social Science*, 324 p., $2. Stimulating to thought are many of the papers included in this volume which has as an appendix a supplement on foreign land problems. In the discussion of international economics the factors that receive consideration include population growth, migration of peoples, international transportation and communication, foreign investment, competition for raw materials, commercial policies and tariff, and American economic policy.

Economics

Science News-Letter, August 30, 1930

AN ECONOMIC STUDY OF FOOD BY FARM AND VILLAGE FAMILIES IN CENTRAL NEW YORK—Faith M. Williams and Julia E. Lockwood—*Cornell University Agricultural Experiment Station*, 52 p. Housewives and dietitians who have struggled to keep in proper ratio the pennies and the calories will be interested in this physiological study in nutrition. In the area studied, the retail value of adequate low cost food for a man at moderate work requiring 3400 calories a day is 49.4 cents.

Sociology—Nutrition

Science News-Letter, August 30, 1930

SOME ASPECTS OF THE CANCER PROBLEM—W. Blair Bell—*Wood*, 543 p., $20. This large volume will be of interest to medical men because it gives an account of the cancer studies of Dr. Bell and his associates of the Liverpool Medical Research Organization. Among other things, they developed the use of lead for treating the disease.

Medicine

Science News-Letter, August 30, 1930

THE BEGINNINGS: EGYPT AND ASSYRIA—Warren R. Dawson—*Hoeber*, 86 p., $1.50.

BRITISH ISLES—Sir D'Arcy Power—*Hoeber*, 84 p., $1.50.

ANATOMY—George W. Corner—*Hoeber*, 82 p., $1.50.

These three little volumes begin a series of handbooks under the general title of "Clio Medica" with the purpose of presenting special phases of the history of medicine. The volume on the beginnings of medicine in Egypt and Assyria contends that the aims of the embalmer and the physician were identical in essence and that both sought to prolong life. The second volume is a history of medicine in the British Isles. The growth of knowledge of anatomy from Galen to the present day is traced in the third volume. The medical student, practitioner or layman interested in medicine will be introduced, through a few hours reading of the volumes of this series, to the beginnings of medicine.

Medicine

Science News-Letter, August 30, 1930

FIFTEENTH ANNUAL REPORT NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS—1929—*U. S. Government Printing Office*, 779 p., $2.35. No other one volume in the world contains more fundamental aeronautical research data than this current annual report of the National Advisory Committee for Aeronautics. Not only does it contain 28 technical reports of investigations made at the Langley Memorial Aeronautical Laboratory, but it discusses progress in aircraft development generally in this country and throughout the world.

Aeronautics

Science News-Letter, August 30, 1930

SCIENCE IN THE KITCHEN—L. W. Bass and others—*University of Pittsburgh*, 82 p., 60c. A series of eight radio talks by fellows of the Mellon Institute covering kitchen planning; the purchase, preparation and care of the food; uses of milk; and food for young children and the school lunch. A modern and surprising and perhaps even unnecessary note is the advice to young homemakers to patronize the delicatessen and the shelf of canned and packaged goods.

Domestic Science

Science News-Letter, August 30, 1930